

The NASA Electronic Parts and Packaging (NEPP) Program – CubeSats

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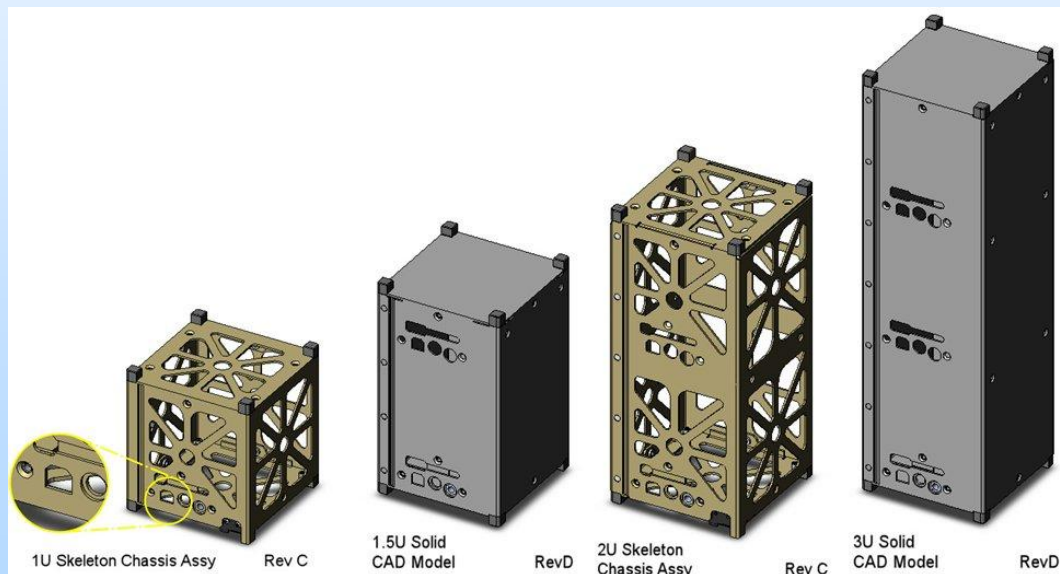
NASA Goddard Space Flight Center (GSFC)

<http://nepp.nasa.gov>



Outline

- Acronym List
- Frame of Reference
- Plans for FY14/FY15
- EEE Parts for Small Missions



http://www.triy.org/ENG/learning4a/images/TRIY_46.jpg



Acronyms

Acronym	Definition
Bldg	Building
COP	Community of Practice
DC	Direct Current
EEE	Electrical, Electronic, and Electromechanical
FY	Fiscal Year
GaN	Gallium Nitride
IP	Intellectual Property
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
NASA	National Aeronautics and Space Administration
NEPP	NASA Electronic Parts and Packaging
POL	Point of Load
RF	Radio Frequency
SEU	Single Event Upset
SiC	Silicon Carbide
specs	specifications
TI	Texas Instruments



Frame of reference

- **NASA, like many other organizations, is showing increasing desire to develop smaller, cheaper missions. NEPP is active in supporting this direction.**
 - **Open EEE parts workshop to be held in Sep 2014.**
- **This area is more appropriately called “small missions” of which CubeSats are a sub-category.**



Notional “swarm” – NASA Edison project

http://www.nasa.gov/sites/default/files/styles/226xvariable_height/public/744216main_edsn_image1.jpg?itok=plm6J5Qq



NEPP Proposed Plan for Small Missions

- **Driving factors**
 - Low power consumption and small volume electronics,
 - Cost-consciousness, and
 - Limited radiation risks (unless outside low earth orbit).
- **EEE parts needs:**
 - Alternate grade and advanced electronics (metrics: power and volume/performance) and
 - Improved EEE parts guidance: tailored standard approach (Class D) and “first exposure” to space/reliability of EEE parts (university CubeSats).



FY14 NEPP Core – Automotive/Commercial Electronics (Small Missions)

Core Areas are Bubbles;

**Boxes underneath are variable
tasks in each core**

Legend

NEPP Ongoing Task

FY14 Proposed New Start

NEPP Research Category – Automotive/Commercial Electronics

Automotive
Electronics

Body of Knowledge
on specs, standards,
and
vendor approaches
Reliability
evaluation of
ceramic capacitors,
discrete transistors,
and microcircuits

Work performed by
Navy Crane in
collaboration

Alternate
Test
Approaches

Effectiveness of
Board Level Testing
for Piecepart
Qualification
(will utilize boards
with processors
and microcontrollers)

Mobile
Processors

Intel Atom,
Qualcomm
Snapdragon
Processors
(radiation only)

Microcontrollers

Freescall
Automotive
Microcontroller
(+ board)

CubeSat vendor
Microcontrollers:
Tyvak
(TI microcontroller),
Pumpkin
(Atmel
microcontroller)
(radiation only)

Advanced
Processors

Freescall P5040
Network Processor
(+board)
(IP for next generation
BAE Systems Rad Hard
Processor)

Requires
collaboration with
Freescall

Guidance,
Documents

Rule of thumb
documents

Policy, Guidelines

Microcontroller
recommendations

CubeSat
Parts Database

COP

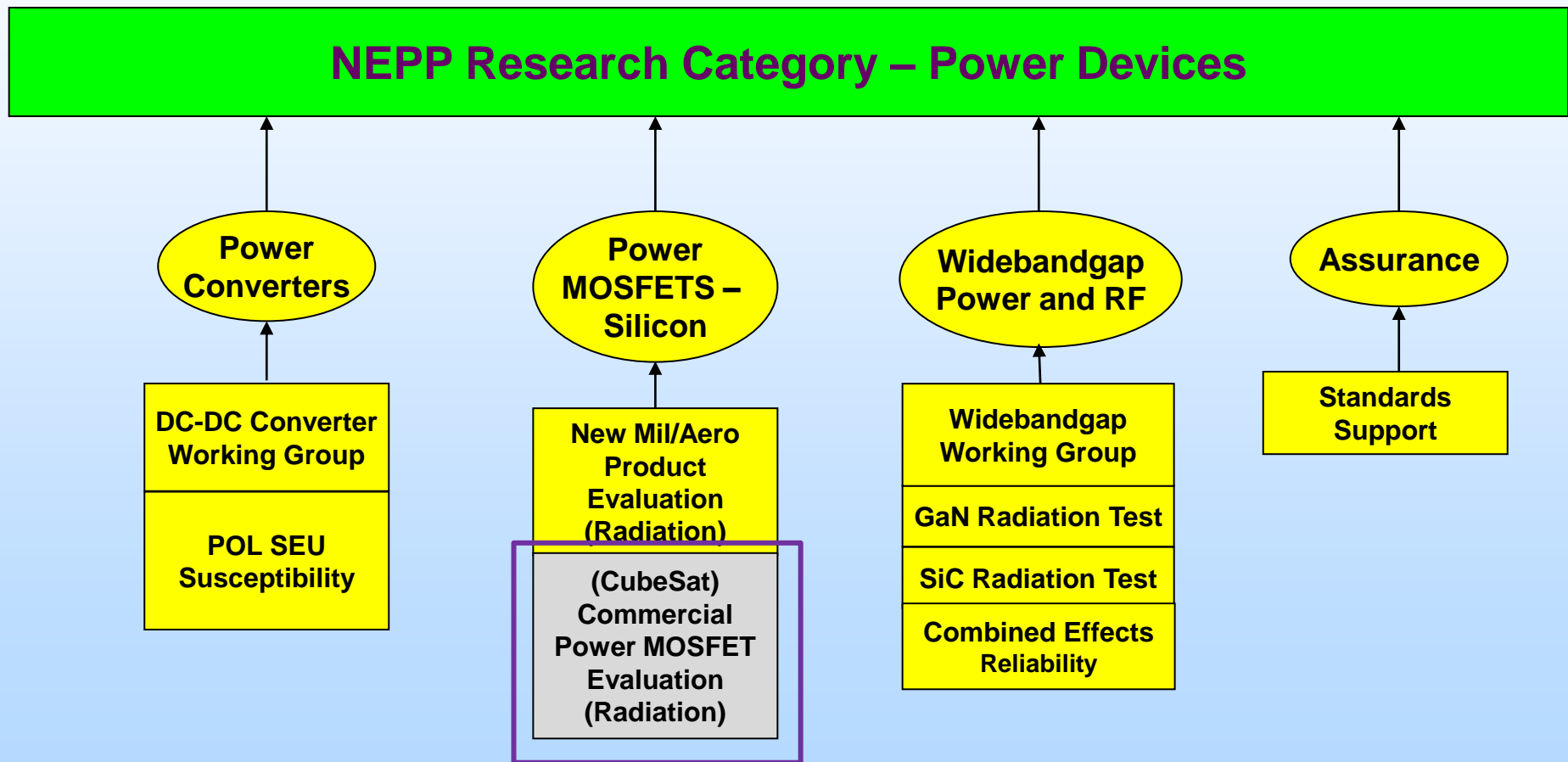


FY14 NEPP Core - Power Devices

Core Areas are Bubbles;

Boxes underneath are variable tasks in each core

Legend	
	NEPP Ongoing Task
	FY14 Proposed New Start





EEE Parts for Small Missions

- **Meeting Dates: Sep 10-11, 2014**
- **Location: NASA/GSFC Greenbelt, MD Bldg. 3 auditorium and via web participation. On-site participation will be limited to US/green card participants as well as auditorium capacity.**
- **As a follow-on to an internal NASA EEE parts workshop held in FY13, the NEPP Program will be hosting an open workshop entitled “EEE Parts for Small Missions.” The focus of this workshop is two-fold:**
 - **Provide small mission designers (and new designers) exposure to reliable use of EEE parts in small missions (i.e., “rules of thumb” for parts usage, testing/qualification, and design), and,**
 - **Provide a forum for discussion of recent efforts, plans, and accomplishments. This will include, for example, a discussion on the use of automotive electronics.**
- **While there is not a formal “call for presentations,” we seek participation from industry, universities, and other government agencies. Volunteers welcome.**